

CLAIMS

What is claimed is:

1. A ceramic tile, which comprises:
  - a ceramic core material; and
  - an oxide ceramic matrix composite (CMC), comprising:
    - a ceramic fiber; and
    - a cured metal oxide ceramic material impregnating said ceramic fiber,  
wherein said ceramic core material has at least one surface covered by  
said oxide CMC.
2. A ceramic tile according to claim 1, which further comprises:
  - a tough low temperature cure coating (TLTC) which infiltrates said at least one  
surface prior to said at least one surface being covered by said oxide CMC,  
wherein said TLTC comprises a cured ceramic powder together with a  
binder.
3. A ceramic tile according to claim 2, wherein said cured metal oxide ceramic material  
impregnating said ceramic fiber and said TLTC are co-cured.
4. A ceramic tile according to claim 2, wherein said ceramic core material has a  
coefficient of thermal expansion, and said TLTC raises said coefficient of thermal  
expansion of said ceramic core material.
5. A ceramic tile according to claim 2, wherein said ceramic powder comprises  
cordierite.

6. A ceramic tile according to claim 2, wherein said binder comprises silica sol.
7. A ceramic tile according to claim 2, wherein said TLTC infiltrates every surface of said ceramic core material, and said oxide CMC entirely surrounds said ceramic core material.
8. A ceramic tile according to claim 2, wherein substantially none of said TLTC lies on said surface of said ceramic core material.
9. A ceramic tile according to claim 2, wherein said TLTC further comprises an emissivity-modifying agent that modifies the emissivity of a region of said ceramic core material surrounding said surface.
10. A ceramic tile according to claim 1, wherein said oxide CMC entirely surrounds said ceramic core material.
11. A ceramic tile according to claim 1, wherein said ceramic core material comprises a sintered mat of ceramic fibers.
12. A ceramic tile according to claim 10, wherein said ceramic fibers comprise silica fibers, aluminoborosilicate fibers, and alumina fibers.

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13. A method of forming a ceramic tile, which comprises the step of:
- covering a surface of a ceramic core material with an oxide ceramic matrix composite (CMC), said oxide CMC comprising:
- a ceramic fiber, and
- a cured metal oxide ceramic material impregnating said ceramic fiber.
14. A method according to claim 13, which further comprises the step of:
- pre-shrinking said ceramic fiber prior to impregnating said ceramic fiber with said metal oxide ceramic material.
15. A method according to claim 14, wherein said pre-shrinking step comprises heating said ceramic fiber.
16. A method according to claim 15, wherein said ceramic fiber is heated to about 1800 °F during said pre-shrinking step.
17. A method according to claim 13, which further comprises the step of:
- infiltrating said surface of said ceramic core material with a tough low temperature cure coating (TLTC) before covering said surface with said oxide CMC, wherein said TLTC comprises a cured ceramic powder together with a binder.
18. A method according to claim 17, which further comprises the step of:
- co-curing said cured metal oxide ceramic material impregnating said ceramic fiber and said TLTC.

19. A method according to claim 18, wherein no curing process has been performed for either said cured metal oxide ceramic material impregnating said ceramic fiber or said TLTC prior to said co-curing step.
20. A method according to claim 18, wherein said co-curing step is performed using an autoclave between about 25 and about 100 psi.
21. A method according to claim 20, wherein said co-curing step is performed between about 50 and about 80 psi.
22. A method according to claim 20, wherein said co-curing step is performed at a temperature ranging between ambient temperature and about 500 °F.
23. A method according to claim 17, wherein said ceramic core material has a coefficient of thermal expansion, and said TLTC raises said coefficient of thermal expansion of said ceramic core material.
24. A method according to claim 17, wherein said ceramic powder comprises cordierite.
25. A method according to claim 17, wherein said binder comprises silica sol.
26. A method according to claim 17, wherein said infiltrating step comprises infiltrating every surface of said ceramic core material, and said covering step comprises entirely surrounding said ceramic core material.

27. A method according to claim 17, wherein upon completion of said infiltrating step substantially none of said TLTC lies on said surface of said ceramic core material.

28. A method according to claim 17, wherein said TLTC further comprises an emissivity-modifying agent that modifies the emissivity of a region of said ceramic core material surrounding said surface.

29. A method according to claim 13, wherein said covering step comprises entirely surrounding said ceramic core material.

30. A method according to claim 13, wherein said ceramic core material comprises a sintered mat of ceramic fibers.

31. A method according to claim 30, wherein said ceramic fibers comprise silica fibers, aluminoborosilicate fibers, and alumina fibers.

32. A ceramic tile produced by a method which comprises the step of: <sup>7</sup>  
covering a surface of a ceramic core material with an oxide ceramic matrix  
composite (CMC), said oxide CMC comprising:  
a ceramic fiber, and  
a cured metal oxide ceramic material impregnating said ceramic fiber.

33. A ceramic tile according to claim 32, wherein said method further comprises the step of:

infiltrating said surface of said ceramic core material with a tough low temperature cure coating (TLTC) before covering said surface with said oxide CMC, wherein said TLTC comprises a cured ceramic powder together with a binder.

34. A ceramic tile according to claim 32, wherein said method further comprises the step of:

co-curing said cured metal oxide ceramic material impregnating said ceramic fiber and said TLTC.

35. A ceramic tile according to claim 32, wherein said method further comprises the step of:

pre-shrinking said ceramic fiber prior to impregnating said ceramic fiber with said metal oxide ceramic material.

36. A ceramic tile according to claim 35, wherein said pre-shrinking step comprises heating said ceramic fiber.

37. A method according to claim 36, wherein said ceramic fiber is heated to about 1800 °F during said pre-shrinking step.